

ABSTRACT

The present invention provides methods for generating endothelial cells in vitro, with functional intercellular communication (e.g. GJIC) that is consistent with normal endothelial cells and cell layers in vivo. In accordance with the invention, expression and appropriate organization of gap junctional proteins in endothelial cells is achieved through a) biophysical engineering, b) genetic engineering, or c) a combination of both biophysical engineering and genetic engineering. The fully functioning endothelial cells generated in vitro, in accordance with the invention are suitable for use in conjunction with substrates and matrices commonly used in tissue engineering of vascular implants.